2

A REVISION OF

THE ANOPHELINÆ

BEING A FIRST SUPPLEMENT TO THE
SECOND EDITION OF

"A HANDBOOK OF THE GNATS OR MOSQUITOES"

BY

LIEUT-COL. G. M. GILES, M.B., F.R.C.S., I.M.S. (Retd.)

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INTRODUCTORY.

THE rapid growth of our knowledge of the *Culicidæ* makes it impossible for any book dealing with the subject to be kept up to date without the occasional publication of supplementary information, in the form of appendices, and as the number of known forms of the important *Anophelina* subfamily has actually doubled since the issue of the second edition of my Handbook, it appears time to present my readers with a revision of the group, which will bring the subject up to date. As far as possible, the new species, which have been selected for illustration in the accompanying plate, are those which have not as yet been figured elsewhere.

At some future time, I hope to issue a further contribution, dealing in the same way with the remaining subfamilies.

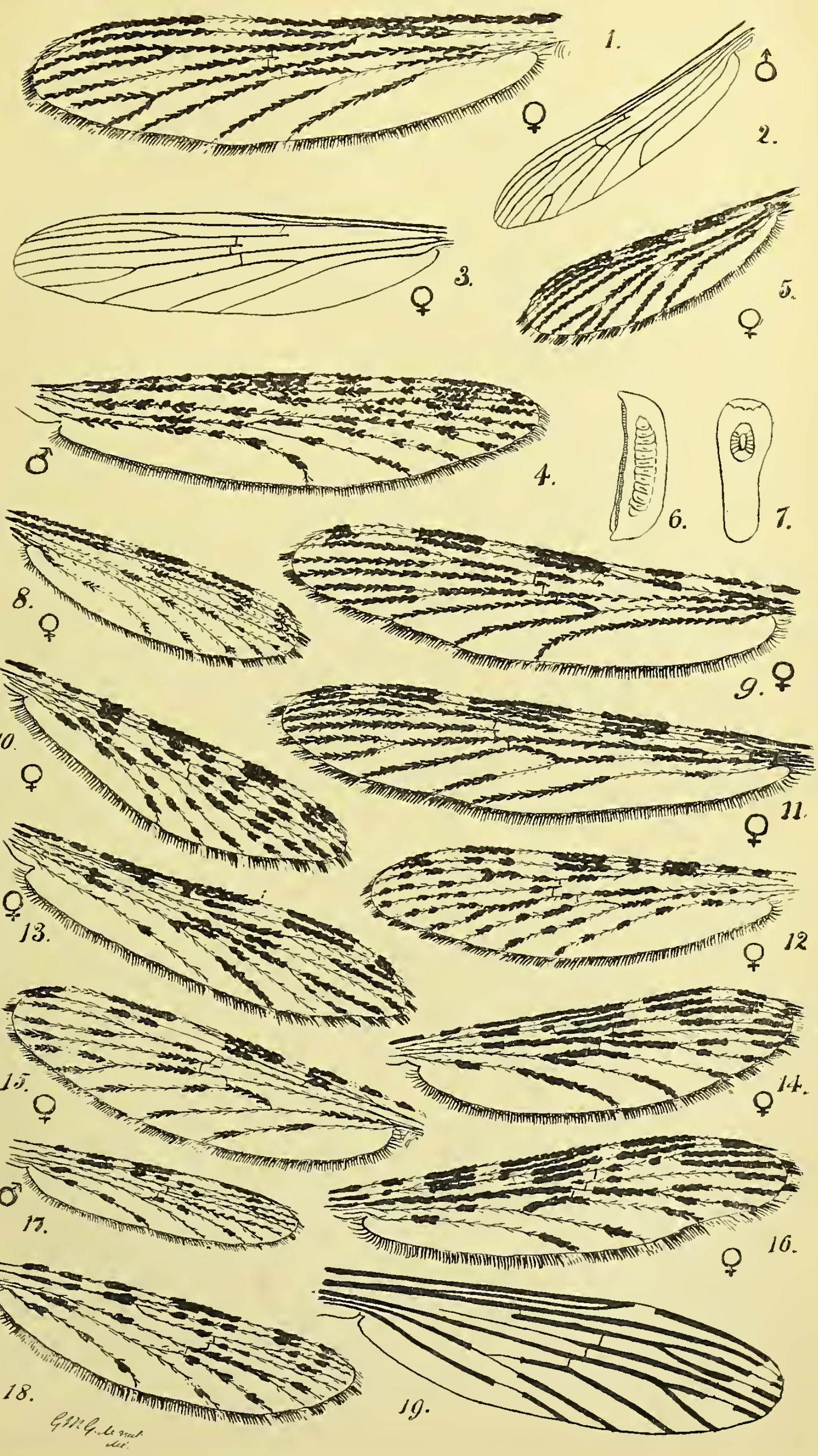
G. M. GILES, M.B., F.R.C.S.
LT.-COL. I.M.S. (RETD.).

Byfield, Mannamead,
October 12*th*, 1903.

EXPLANATION OF PLATE.

Fig. 1.—*Anopheles Franciscanus*, Kellog.
Fig. 2.—*Stethomyia fragilis*, Theob.
Fig. 3.—*Stethomyia nimba*, Theob.
Fig. 4.—*Cycloleppteron mediopunctatum*, Theob.
Fig. 5.—*Myzomyia picta* (Loew).
Fig. 6.—Egg of *Myzomyia culicifacies* (Giles). (After Theobald).
Fig. 7.—Egg of *Myzomyia Turkhudi* (Liston). (After Theobald).
Fig. 8.—*Myzomyia albirostris*, Theob.
Fig. 9.—*Myzomyia Turkhudi* (Liston).
Fig. 10.—*Myzomyia punctulata* (Dönitz).
Fig. 11.—*Myzomyia longipalpis*, Theob.
Fig. 12.—*Myzomyia leucophora* (Dönitz).
Fig. 13.—*Pyretophorus Jeypurensis*, Theob.
Fig. 14.—*Pyretophorus Marshallii*, Theob.
Fig. 15.—*Pyretophorus Pitchfordi*, Power.
Fig. 16.—*Pyretophorus Pretoriensis*, Theob.
Fig. 17.—*Nyssorhynchus nivipes*, Theob.
Fig. 18.—*Nyssorhynchus Phillippinensis* (Ludlow). (Diagramatic).
Fig. 19.—*Myzorhynchus Coustani*, Laveran. (After Laveran.)

With the exception of those otherwise noted, the above drawings of wings were made by camera lucida, at or about the same magnification, which is somewhat higher than that adopted in the plates previously furnished in the Handbook, as under an amplification of 10 diams. only, some of the smaller wings come out inconveniently small.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A REVISION OF THE ANOPHELINA SUBFAMILY.

Since the issue of the second edition of my "Handbook of the Gnats or Mosquitoes," although less than two years have passed, an enormous amount of new material has come to hand at the British Museum; and in addition to this a number of forms have been described in various publications though unfortunately some of these descriptions are none too clear. This is especially the case with the numerous species proposed by Dönitz, who appears to have a preference for specimens preserved in balsam, a method which practically obliterates all details of scale structure, and, as Mr. Theobald remarks, his descriptions resolve themselves into a dissertation on the venation of the wing, a class of character which, as has been repeatedly pointed out, both by Mr. Theobald and myself, varies so widely that the record of any but the widest indications of the sort is a mere waste of paper on describing the peculiarities, not of species, but of some particular individual. As far as possible, Dönitz's new species have been inserted in their places below, but except in the few cases in which specimens have been sent to the Museum, it must be understood that their position is a mere matter of guess work.

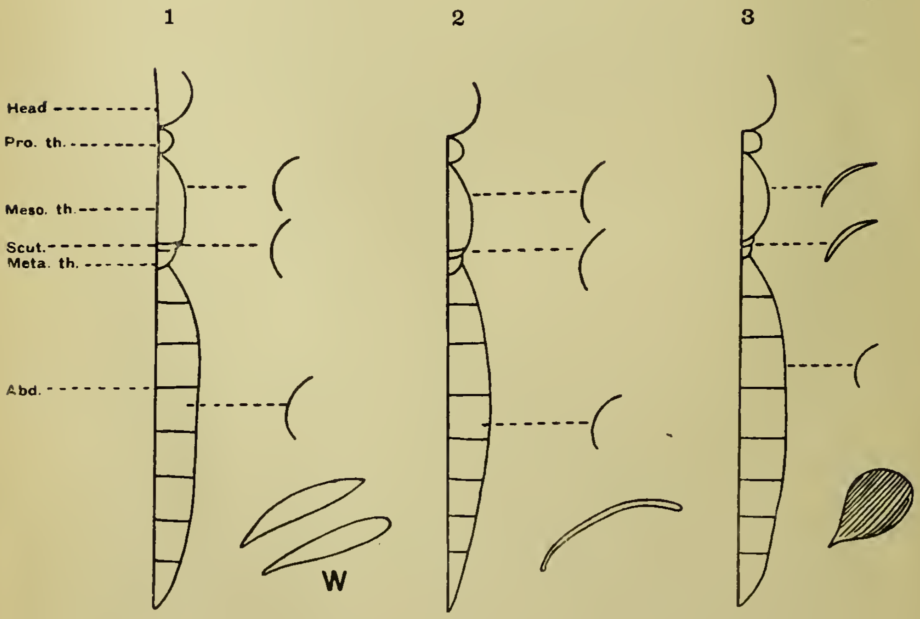
The number of *names* enumerated in the list below is actually exactly double that included in my second edition, and as "the cry is still they come" it may be expected that many more species, good, bad, and indifferent, will ultimately have to be added to it. I am far, however, from thinking that anything like this total of ninety-six names at present in use really represent distinct species, as the increasing well-known variability of many species makes it probable that, when our knowledge of larval characters is more exact, a large number may, it is to be hoped, be able to be dropped as mere synonyms, but at present we must still be content with the record of *forms*, and it must be clearly understood that I attach no higher value to a large number of the so-called species that must perforce be noticed.

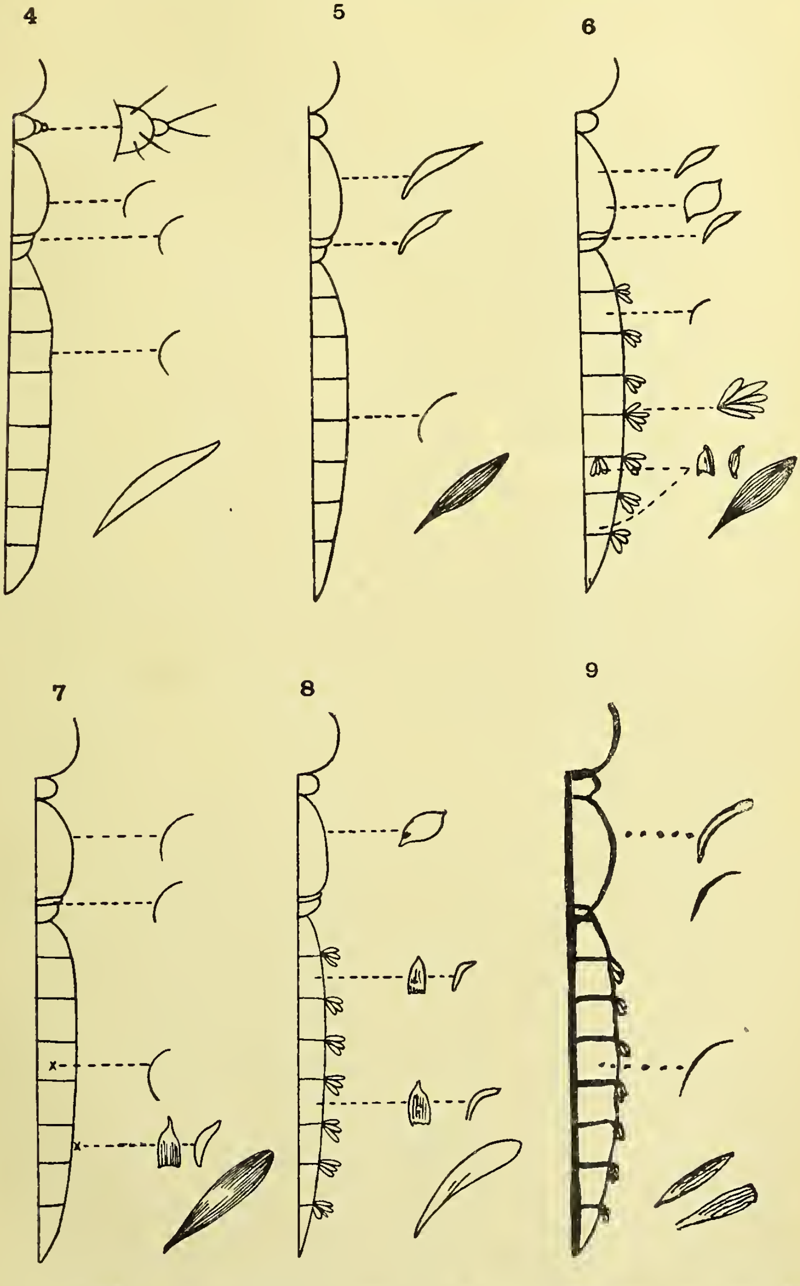
Added to this, the entire classification of the subfamily has been entirely remodelled by Mr. Theobald in a communication to the *Journal of Tropical Medicine*, June 16th, 1902, and though the names of some of the genera have had to be altered by Blanchard, on account of the names employed having already been used as generic terms, the new genera appear to be generally approved, and may be expected to come steadily into general use. With this new classification as a whole I am well pleased, as most of the new genera appear to round up a fair number of species into a really natural group, but some do not appear so satisfactory; having been made to accommodate the peculiarities of some one or two species which chance not to fit themselves well into either of the larger genera. Such a process, if pursued too far, inevitably results in degrading genera to the level of species; and except where, as is the case with *Cycloleppteron*, the peculiarity is of a very striking character, it is far better to widen the limits of an existing, but not as yet unwieldy, genus than to institute a new one. I should prefer, for example, to keep *Stethomyia* within the limits of *Anopheles*, in spite of the little buttons on its shoulders. *Arribalzagia maculipes* (Theob.), too, is doubtless a fairly striking species, but though its lateral abdominal scale tufts make it in some respects a transition form between *Myzorhynchus* and *Nyssorhynchus*, it certainly strikes the eye as having the *facies* of the former genus, and the number of generic terms employed in natural history would at once have to be more than doubled if every transition form that will not fit exactly any one genus has to be provided with a genus all to itself. For such "links" will always present themselves, and indeed, far from being blots on, are really excellent signs of the validity and naturalness of the plan of classification adopted. *Chrystya implexa*, on the other hand, though evidently near *Myzorhynchus*, is perhaps too queer an insect to be easily admitted to that or any other of the genera.

The same might certainly be said of *Aldrichia error*, if it really be a species and not an abnormal individual; for an Anopheline, with the flat-scaled abdomen of a *Culex*, is, it need hardly be remarked, a most curious combination; but I am inclined to suspect that the single specimen upon which the genus is constituted is simply an aberrant *Myzomyia Rossii*, a "sport," in fact, of the same class as the bearded lady. Curiously enough, I came across a similar specimen in the case of the individual I dissected for the purpose of describing my *Myzomyia culicifacies*, and based the name I gave the species largely upon the undoubted fact that the abdomen was scaled like a *Culex*. The description of that species was drawn up in the dawk bungalow at Hoshangabad, where I first met with it, and the remains of the dissected specimen, except perhaps the wing, were thrown away, as I had many other specimens. But I was extremely puzzled to find, on subsequently examining these after my return to England, that the abdomen was absolutely without scales in either sex. Now either this was another instance of abnormality, or there is to be found, on sufficient search, another species of *Aldrichia*, which mimics *M. culicifacies* in exactly the same way that *Al. error* simulates the appearance of *M. Rossii*. This, however, appears to me unlikely, and I shall continue to look upon *Al. error* as a mere abnormality, until more material of the species, and especially its larva, come to hand.

Another regrouping of the family has also been proposed by Mr. Neveu-Demaire, based mainly on the characters of the palpi; but is hardly likely to gain any acceptance, as apart from the fact that it does not sufficiently subdivide the subfamily, it is based on characters which vary greatly, even in obviously closely-allied species, and would in effect group them in a manner scarcely less artificial than that of a mere "diagnostic" table. It is unpractical too, because it is quite impossible to ascertain the exact number and form of the joints of the palpi without dissection.

Mr. Theobald's rearrangement of the *Anophelinæ* is based, like his previous work in the same direction, entirely upon the characters of the scales and hairs covering the insect, for the characters given of the palpi, where included in the generic diagnosis, do not, it will be noted, refer to the form and character of the organ itself, but depend in reality on the form and density of their scaly covering. To place any given specimen in its appropriate genus the principal points to be noted are the form and character of the scales or hairs covering the thorax, abdomen and wings, while secondary characters are afforded by the bushiness or otherwise of the palp-scales, and the form of the scales on the head. At present the eleven genera tabulated below are all that have been formulated, but it is quite possible that the number may have to be supplemented.





Schematic Representation of the Regional Scale Characters of the Nine Principal Anopheline Genera, after Theobald.

1, *Anopheles*; 2, *Myzomyia*; 3, *Cycloleppteron*; 4, *Stethomyia*; 5, *Pyretophorus*; 6, *Nyssorhynchus*; 7, *Myzorhynchus*; 8, *Cellia*; 9, *Aldrichia*. (Showing general squamose characters.) W, Typical wing-scales.

TABLE OF MR. THEOBALD'S REARRANGEMENT OF THE *Anopheline* SUBFAMILY.

No.	Mezothoracic Armature.	Abdominal Armature.	Form of Wing Scales.	Armature of Head.	Other Generic Characters.	Genus.
1	Entirely hairy	Hairy	Lanceolate	No median flat scales	♀ palpi thin. Usually large species	*Anopheles*, Meig., as restricted by Theobald
2	" "	"	"	A median band of flat scales	♀ palpi very thin. Prothoracic lobes mammillated	*Stethomyia*, Theob.
3	" "	"	Lanceolate and peculiar large, round, inflated scales	No median flat scales	♀ palpi densely scaly	*Cycloleppteron*, Theob.
4	" "	"	Long, narrow, lateral scales, projecting far apart	Ordinary forked scales	♀ palpi not bushy. Wings usually much spotted in contrasted colours	*Myzomyia*, Blanchard
5	Some narrow curved scales in addition to hairs	"	Narrow lanceolate	Peculiar broad falciform scales each side middle of frons, replaced in some species by flat scales	♀ palpi moderately densely scaled	*Pyretophorus*, Blanchard
6	Hair-like curved scales	Hairy on dorsum, but venter scaly with apical, but no lateral tufts of scales	Broadly lanceolate	No flat scales	Palpi and proboscis very densely scaled	*Myzorhynchus*, Blanchard
7	Narrow curved scales in front, hair-like behind	Venter scaly, with apical lateral, but no median tuft of scales	Lanceolate and clavate	No flat scales	Palpi densely scaly, clypeus of peculiar form	*Arribalzagia*, Theob.
8	Curved, hair-like scales	Short, stiff bristles, with dense tufts of thick, stiff, slightly curved and clubbed hairs, projecting vertically from sides of abdomen	Lanceolate	Ordinary forked scales	Palpi and proboscis densely scaled	*Chrystya*, Theob.
9	Narrow curved, or spindle-shaped true scales	Dorsal patches of small flat scales, and lateral scale tufts	Bluntly lanceolate	No flat scales	Palpi rather densely scaled; legs much banded and spotted and often with white feet	*Nyssorhynchus*, Blanchard
10	Flat, spindle-shaped scales	Almost completely scaley, with large lateral tufts	Large bluntly lanceolate	No median flat scales	Usually large, handsomely ornamented insects	*Cellia*, Theob.
11	Hairy	Completely clothed with flat scales, as in *Culex*	Long, narrow, lateral scales	No median flat scales	Palpi not densely scaled, antennæ with scales on some of the basal joints	*Aldrichia*, Theob.

It must be remembered that it is quite useless to attempt to identify the genus of a specimen without the use of the compound microscope, though it is not necessary to use anything higher than a power of 1 in. focal length. If the rackwork of the instrument be too short to admit of focussing a pinned specimen placed on the stage, place the cork to which it is pinned on the mirror, and let the lens peep at it through the hole in the stage plate.

By varying the angle at which the pin holding the card disc is stuck into a flat cork, it will be found quite easy to bring all parts well into view, though it is sometimes rather difficult to determine the characters of the venter in pinned specimens, but even of this one can usually get a fair side view; and it is in no way necessary to dissect or otherwise mutilate the specimen to make out all that is required.

It will, however, be, I suspect, some time before naturalists get accustomed to the new classification, for that the determination is by no means always easy is shown by the numerous changes in the position of species that have been made by Mr. Theobald himself, since he first outlined his system in the *Journal of Tropical Medicine*, one species which figures as the type-species of a genus in that communication being now relegated to a humble position in quite another genus, while some others have, I think, altered their places in the collection even since the issue of the third volume of the monograph. Such changes are, of course, almost inevitable, in view of the immense amount of material that has to be studied in the now enormous collection of the British Museum; but they do show that generic position under his system is not a matter that can be settled off hand, and hence I am convinced that for the purposes of, at any rate, the amateur entomologist, a diagnostic table of the entire subfamily, based upon obvious colour-characters, will be more useful than separate tables for each genus, and have accordingly drawn up such a table, on the same plan as that employed in my Handbook, but brought up to date so as to include all species at present to hand.

DIAGNOSTIC TABLE OF THE ANOPHELINA SUBFAMILY.

The various species may be most conveniently recognised by dividing them first into three categories, by easily recognisable characters of the wing, *viz.* :—

I.—With the wing spotted in contrasted colours.
II.—With the wings spotted with clumps of scales.
III.—With the wings unspotted.

The species included in the first group are very numerous and may be best subdivided according to the characters of the legs.

A.—With some or all the feet white.

B.—With the end of the last tarsals dark, but some at least of the tarsals pale-banded, and the upper leg-joints ornamented throughout their length.

C.—With banded tarsi, but the legs at most ornamented with spots at the joints.

D.—With tarsi unbanded.

SUBDIVISION *A.*—*White-footed species.*

a. With the end joints of all the feet pale.

1. *Cycloleppteron mediopunctatum*, Theob. Only the last tarsals are pale. Wings and legs very elaborately marked.
2. *Anopheles albimanus*, Wied. At present a purely nominal species.

b. With the fore and hind feet pale.

3. *Cellia Bigotii*, Theob. Wings with two large and a smaller internal pale costal spot.

c. With the hind feet only more or less extensively white.

Last three tarsals and all but base of 2nd white.

4. *Cellia pulcherrima*, Theob. Costa equally divided into three pale and three dark spots, with two basal dots.

Last three tarsals and apex of 2nd pale.

5. *Nyssorhynchus maculipalpis* (Giles). Costa dark with seven small wing-spots. Femora spotted and palpi elaborately adorned. Wing-fringe spotted at all long junctions.
6. *Nyssorhynchus Jamesii* (Theob). Costa dark at apex and base, with four creamy spots and two basal dots ; wing-fringe not spotted. The femora are spotted, but not the palpi.
7. *Nyssorhynchus Phillippinensis*, Ludlow. Resembles the two above species, but neither the upper leg-joints nor the palpi are spotted through their length, and the latter are golden brown instead of black.

8. *Cellia argyrotarsis* (R. Desv.). Costa black, with an apical, and two costal pale spots, as well as two basal dots; fringe spotted at all long junctions. Femora and palpi not spotted.

9. *Nyssorhynchus albipes* (Theob.). Closely resembles the above, but outer wing spot not absolutely on the apex, and has a minute black ring round the last white tarsal joint.

10. *Nyssorhynchus nivipes*, Theob. Costa white, with four black spots so placed as to leave an unusually long pale apical patch. Legs clothed with mixed dark and pale scales, but not spotted.

11. *Nyssorhynchus fuliginosus* (Giles). Wing sooty, with an apical and three minute white costal spots; sometimes one or two basal dots; fringe spotted at all junctions. Legs and palps not spotted.

12. *Myzorhynchus paludis* (Theob.). Costa dark, with two pale interruptions; fringe with spot at junction of V only.

13. *Chrystya implexa*, Theob. Costa black, with two large and two small pale spots alternating; fringe spotted. Abdomen black, with tufts of stiff bristles projecting vertically from the sides of the segments.

Last two tarsals and all but base of 3rd white.

14. *Nyssorhynchus Pretoriensis*, Theob. Closely resembles *N. maculipalpis*, but, besides having one less white hind tarsal, the palpi are not spotted, and their two white apical bands are further apart.

Last two tarsals and apex of 3rd white.

15. *Nyssorhynchus Theobaldi* (Giles). With five small white spots on the black costa (two of which are really large basal dots). Tibiæ and 1st tarsals elaborately white-ringed.

16. *Myzorhynchus Mauritianus* (De Grandpré et De Charmoy). Closely resembles *M. paludis*, except in having shorter hind feet, and in the wing-fringe being unspotted.

17. *Myzorhynchus* (?) *Ziemani* (Von Grünberg). A punctiform pale spot, limited to the costa, about the middle, and a larger, ill-defined spot on the apex of the wing. Palpi tipped and banded white.

18. *Myzorhynchus Coustani*, Laveran. Closely resembles *M. Ziemani*, but the palpi are unbanded.

Last tarsal and apex of 4th forming the white foot.

19. *Cellia Kochii* (Dönitz). Costa white, with six dark spots and dots, the largest just inside the cross-veins; only a few black dots on the rest of the wing. Thorax with eye-shaped markings.

20. *Nyssorhynchus maculatus* (Theob.). Costa black, with four pale spots (including two basal dots) and pale apex; fringe spotted. Femora and tibiæ elaborately banded and spotted.

21. *Nyssorhynchus Willmori*, James. Resembles *N. maculatus*, but has the abdomen densely scaly, and has only three instead of four bands on the ♀ palpi.

22. *Nyssorhynchus Karwari*, James. Closely resembles the two above species, but wants the adornment of the upper leg joints.

23. *Cellia Pharœnsis* (Theob.). Costa dark, but pale at the apex and absolute base, three large black spots, with two smaller towards the apex, and two dots at the base (seven in all); fringe spotted. Femora and tibiæ spotted.

24. *Cellia albofimbriata* (Giles). A variety of the above (?) in which the wing-fringe is uniformly pale.

25. *Myzorhynchus albotæniatus*, Theob. Apart from its white feet, closely resembles *M. barbirostris* (*vide infra*), but the wing-fringe is quite unspotted, and there are prominent tufts of black scales on the forkings, &c.

Apex only of the last tarsal pale.

26. *Myzomyia tesselata* (Theob.). Costa black, except at absolute base, with two prominent spots far out, and five dots (in two groups) more to the base. Legs banded and mottled. Outer half of proboscis pale, but for a narrow black ring near the tip.

27. *Myzomyia punctulata* (Dönitz). Closely resembles *M. tesselata*, but only the actual tip of the proboscis is pale.

28. *Myzomyia Lutzii* (Theob.). Wings with three small pale spots on the dark costa, two near the apex, the third close to the base; fringe spotted. Upper leg-joints unbanded.

SUBDIVISION *B.—Species with dark feet, but the tarsi banded, and upper leg-joints adorned through their length.*

a. Species with the pale parts of the costa larger than the dark.

Costa with six dark marks.

29. *Nyssorhynchus Stephensi* (Liston). Costa with the apex pale, but the absolute base dark, with four black spots, and a dot rather smaller than the corresponding light parts; interior fringe spotted; VI. with three black dots.

30. *Myzomyia Ludlowi*, Theob. Costa with four black spots and two dots; fringe spotted; VI. with two black spots; 2nd pale ring of ♀ palp, close up to the tip.

b. Species with the dark portions of the costa more extensive than the pale parts.

Costa with five pale marks.

31. *Cellia squamosa* (Theob.). Costa with three small white spots and two large basal dots; fringe spotted only as far as junction of posterior IV. Pleuræ striped. Abdomen tufted.

32. *Pyretophorus merus* (Dönitz). Costa with three pale spots and two basal dots; fringe with very broad spots; a characteristic solitary black spot at the root of V.

Costa with more than five pale marks.

33. *Pyretophorus costalis* (Loew). Costa with the apex, three spots, and two basal dots pale; fringe spotted; VI. with three black patches. Differs from *P. merus* in possessing a distinct pale apical costal spot, and in the spots on the wing-fringe being narrow.

34. *Arribalzagia maculipes*, Theob. The dark costa is subdivided by a large number of yellow spots, but what strikes the eye are three large dark patches which extend far across the wing; fringe not spotted.

35. *Myzomyia elegans*, James. Costa white at the apex, with three pale spots and three large basal dots; all along veins elaborately spotted; VI. with four black marks, fringe spotted. Apical pale band on palp ♀ narrow.

36. *Nyssorhynchus deceptor* (Dönitz). Resembles *M. elegans* in its markings, but has five dark marks on VI. The ♀ palpi are white from the middle of the second joint, and the proboscis has a pale tip.

37. *Myzomyia leucophora* (Dönitz). Resembles *M. elegans*, but there are seven black spots on VI., and the ♀ palpi show only traces of two apical bands, and the proboscis is dark throughout.

38. *Nyssorhynchus Mastersi* (Skuse). Also resembles *M. elegans*, but has six dark marks on VI. The ♀ palpi have the third, fourth, and fifth joints nearly pure white, with narrow black basal bands, while the first two are dark, but for a narrow white apical band on the second.

39. *Nyssorhynchus annulipes* (Walker). Agrees closely with *N. Mastersi*, but the last three joints of the ♀ palpi have broad white apical bands, and the first two white patches above. (It is obvious that generic characters will be of great value in distinguishing this puzzling group *of superficially similar* species).

SUBDIVISION *C.—Species with dark feet, but the tarsi banded, though the upper leg-joints are unadorned, except in some cases by spots on the joints.*

a. Species with the light parts of the costa exceeding or about equalling the dark portions.

40. *Myzomyia Rossii* (Giles). Costa pale both at apex and the absolute base, with four black spots and two dots, the third spot from the apex T-shaped; the fringe spotted. The second black length of the ♀ palp does not greatly exceed the end one.

41. *Aldrichia error*, Theob. Like *M. Rossii*, but with the T-shaped dark spot and that next inside it united. Abdomen scaled like a *Culex*.

42. *Pyretophorus superpictus* (Grassi). Costa black both at apex and base, with the intervening portion about equally divided between three black and three white spots and a basal dot; fringe not spotted.

b. Species in which the dark parts of the costa distinctly exceed the pale portions.

With a single pale costal spot, and the ♀ palpi unbanded.

43. *Myzorhynchus umbrosus*, Theob. A single yellow spot just inside the apex; apical fringe yellow and black.

With two pale costal spots, and the ♀ palpi unbanded.

44. *Myzorhynchus barbirostris*, Van der Wulp. The spots are white, placed at apex and opposite middle of anterior fork-stem; fringe spotted at junctions of III. and forks of V. Palpi sooty.

45. *Myzorhynchus Bancroftii* (Giles). Resembles *M. Barbirostris*, but the inner pale costal spot is placed close up to the base of anterior fork, and the fringe is prominently spotted at all the junctions but that of VI.

46. *Myzorhynchus pseudobarbirostris* (Ludlow). Like the two above, but the palpi look rusty owing to their scales being tipped yellowish. Fringe spotted at junctions of I., II., and IV.

With two pale costal spots, but the ♀ palpi banded.

(This constitutes the "Sinensis group," of which species the others are probably mere varieties.)

47. *Myzorhynchus Sinensis* (Wied.). Inner costal spot just outside the cross-veins; apical fringe yellow; interior fringe spotted at junction of posterior V.; III. mainly pale; outer pale spot extends to anterior II.

48. *Myzorhynchus pseudopictus* (Grassi). Inner costal spot further out towards base of anterior fork; III. mainly clothed with alternate dark and pale scales; apical fringe darker.

49. *Myzorhynchus minutus*, Theob. Like *M. Sinensis*, but costal spots white instead of yellow, and anterior fork-cell all black-scaled.

50. *Myzorhynchus vanus* (Walker). Has the internal fringe of the wing unspotted.

51. *Myzorhynchus Indiensis* (Theob.). Like *vanus*, but has the inner costal spot well out towards the base of fork-cell.

52. *Myzorhynchus alboannulatus*, Theob. Like *vanus*, but has the tarsal banding more prominent.

53. *Myzorhynchus niggerrimus* (Giles). The outer costal spot is subapical, instead of at the apex, and the anterior fork-cell and III. all black-scaled; internal fringe yellow at the apex, elsewhere dark.

Costa with four pale markings.

54. *Myzomyia albirostris*, Theob. Costa black, with three almost equal yellow spots, and a minute basal dot; apical fringe yellow, except opposite II.; inner fringe interrupted at all junctions. Outer half of proboscis white.

55. *Pyretophorus cinereus* (Theob.). Costa black, with apex and three pale spots; third black area much the longest, and subdivided by a white dot on I.; fringe not spotted. Second antennal joint abnormally long.

56. *Myzomyia longipalpis*, Theob. Costa black, with four nearly equal small yellow spots, extending evenly to I., except the first, which spreads in on I. to the root of the wing; absolute apex and apical fringe yellow; fringe spotted at all junctions but that of VI. The hind tarsi only are banded.

Costa with five pale markings.

57. *Myzomyia aconita* (Dönitz). Costa with the apex, three prominent spots, and a basal dot pale.

58. *Pyretophorus Pitchfordi*, Power. Costa black at apex, pale at the absolute base, with three large yellowish spots approaching the dark parts in length, and two basal dots; rest of long veins mainly pale, but with several longish black marks; fringe broadly interrupted at all junctions.

Costa with six pale markings.

59. *Myzomyia Jeypurensis*, Theob. Costa black, with two small spots near the apex; two others, the inner of which scarcely affects the costa, further in, and two basal dots; fringe spotted at all long junctions.

60. *Pyretophorus Marshallii*, Theob. Costa pale at apex, dark at absolute base, with three small creamy spots and two basal dots; an additional pale spot on I., close to origin of II.; fringe spotted at all long junctions.

In the following species of this subdivision the tarsi are banded in the ♂ only, and barely perceptibly in the ♀.

61. *An. gigas*, Giles. Costa with two pale spots in the ♀, and three in the ♂, as well as an apical spot and a single basal dot; fringe spotted in the ♀, all pale in the ♂. General colouration chocolate. Palpi unbanded.

Subdivision *D.—With the tarsi unbanded.*

With the apex only pale.

62. *An. Lindesayii*, Giles. Wings with a large apical patch, involving all veins to III. inclusive; fringe dark, except at posterior V. junction. Hind femora with a broad pale band.

With two pale spots on the dark costa.

63. *An. Franciscanus*, Kellog. But for the unbanded tarsi much resembles the *Sinensis* group, but the wing-fringe is spotted at all the long junctions.

64. *Cycloleppteron Grabhamii*, Theob. Spotted on the wing much as in *Sinensis*, but the inner spot is close down to the cross-veins, and the generic wing-scales easily distinguish it.

65. *An. punctipennis*, Say. A large apical patch extending obliquely inwards across the wing, and another large pale spot involving II. just outside the cross-veins; fringe unspotted.

66. *An. pseudopunctipennis*, Theob. Like the above, but has the wing-fringe spotted at all long junctions.

With three pale spots on the dark costa.

67. *An. punctipennis*, Say, "*Var. A.*," Theob. Has an additional large pale spot nearer the root of the wing.

68. *Myzomyia picta* (Loew). Costa with the apex pale, and two pale spots placed far in, the proximal of which only slightly involves the costa; fringe spotted. Femora very densely scaled, making them look swollen at the base.

With four pale spots on the dark costa.

69. *Myzomyia funesta* (Giles). Costa with the apex pale, and three pale spots much smaller than the intervening dark portions; fringe spotted, except at junction of VI. Palpi with broad pale apex, and two other bands, the distal broad, while the proximal is narrow.

70. *Myzomyia Christophersi* (Theob.). Practically identical with the above, but the black interval between the two distal pale parts of the ♀ palpi is much longer than they, not about equal to them, as in *funesta*.

71. *Myzomyia Rhodesiensis* (Theob.). Resembles the two above species, but the palpi ♀ are black at the tip, and the wing-fringe is unspotted.

72. *Myzomyia hebes* (Dönitz). Much resembles *M. Rhodesiensis*, but has the wing-fringe spotted, and the first two joints of the ♀ palpi pale.

73. *Myzomyia* (?) *impuncta*, Dönitz. Appears to belong to this group, differing in the pale-scaled portions of long veins greatly preponderating, and possibly also on the costa.

74. *Pyretophorus minimus* (Theob.). Wing spots disposed much as in *funestus*, but the back of the wing is paler, the fringe spotted, and the thorax has lanceolate scales in front.

75. *Pyretophorus Palestinensis*, Theob. Has the pale parts of the costa nearly as extensive as the dark parts, not distinctly smaller, as in *minimus*.

With five pale markings on the dark costa.

76. *Myzomyia culicifacies* (Giles). Wing with the apex pale, and four small yellow spots, outer three of which extend uniformly to I., while the basal has the pale patch on that vein outside that on the costa; rest of wing, including the fringe, dark but for small spots on the forkings and transverse veins. Palpi of ♀ with minute pale tip and two narrow, widely separated bands.

77. *Myzomyia Listoni* (Giles). Closely resembles the above, but the basal wing-spot is largest of all, and its continuation on I. spreads inwards, not outwards; there is also an additional yellow spot in the middle of VI., and on V. opposite it, as well as signs of spotting on the fringe. *M. Indica* (Theob.) appears to be the same.

78. *Myzomyia Turkhudi* (Liston). Closely resembles *M. Listoni*, but has the wing-fringe spotted distinctly, and a small black tip to the ♀ palpi.

79. *Myzomyia Hispaniola*, Theob. Like *M. Turkhudi*, but has the black tip of the ♀ palpi broader.

With five dark markings on the pale costa.

80. *Pyretophorous Chaudoyei.* The pale portions greatly preponderate on the wing, rendering the spotting of the fringe indistinct. Abdomen of ♂ prominently adorned.

II.—With the costa uniformly dark, but the wing-field spotted with dense tufts of scales.

a. With light-coloured spots on the wing-field.

SUBDIVISION *C.—With the tarsi unbanded.*

81. *Pyretophorus atratipes* (Skuse). Wings with five tufts of scales, and white spots on all long veins after posterior II.; a yellow spot on apical fringe.

82. *An. crucians*, Wied. Wings with dusky tufts, and VI. white but for three black dots. Palpi with four basal bands.

83. *An. Eiseni*, Coquillett. Much resembles *An. maculipennis*, but has two patches of white scales on I., and apical fourth of hind tibiæ yellowish.

b. With the wings spotted with tufts only.

SUBDIVISION *B.—With the tarsi banded.*

84. *An. annulimanus*, Wulp. Wings with two tufts on the wing-field. Abdominal segments with darker hind borders.

SUBDIVISION *C.—With the tarsi unbanded.*

85. *An. maculipennis*, Meig. Wings with four tufts of scales. Thorax with black and gold linear adornment.

III.—With the wing uniformly coloured.

SUBDIVISION *A.—With white feet.*

86. *An. annulipalpis*, Arribal. Costa black, other veins clothed with mixed black and gold scales.

SUBDIVISION *B.—With banded tarsi.*

87. *An. immaculatus*, Theob. Wing uniformly yellow. Palpi and proboscis unusually short.

SUBDIVISION *C.—With unbanded tarsi.*

88. *An. stigmaticus*, Skuse. Wing dark-scaled, but with its yellowish membrane marked with an ill-defined pigmented patch in the stigmatic region.

89. *An. bifurcatus* (L.). Has a patch of creamy scales on the head, and a paler band at the base of the first tarsal.

90. *An. Algeriensis*, Theob. Smaller than the above, but otherwise identical, though the larva is said to differ.

91. *An. Aitkeni*, James. An uniformly dark insect much resembling *An. bifurcatus*, but distinguishable by the hinder fork-cell being little over half the length of the anterior.

92. *An. ferruginosus*, Walker. Ferruginous, with fuscous abdomen. Thorax with indistinct linear markings. A few white scales on the bases of the tarsal joints.

93. *An. Walkeri*, Theob. Like *bifurcatus*, but with no central creamy scales on the head.

94. *An. nigripes*, Staeger. Head with white scales on the nape, but not in front; no band on first tarsals.

95. *Stethomyia nimba*, Theob. Looks like *bifurcatus*, but white scales on frons are flat, and the prothoracic lobes have a nipple-shaped process.

96. *Stethomyia fragilis*, Theob. Pale greenish-brown throughout, and almost entirely devoid of ornament. Posterior fork-cell very small, and its stem disproportionately long.

It now remains only to sort the various species into their appropriate genera, and to supply short descriptions of the various new species that have come to hand or have been described elsewhere.

GENUS ANOPHELES, Meig (as restricted by Theobald).

Thorax and abdomen hairy. Palpi of ♀, thin, generally unbanded. Wing-veins with long lanceolate scales, which may or may not form tufts, but rarely showing much colour-spotting. Mostly large species from temperate or mountain climates.

1. *Anopheles maculipennis*, Meig.

For description, *vide* H. B.,* p. 326, or M., I., p. 191, and III., p, 17.

Additional localities Crete, Cyprus. Is, in Europe, probably the commonest vehicle of malarial poison.

2. *An. Bifurcatus*, L.

For description *vide* H. B., p. 328, or M., I., p. 195, and III., p. 19.

Mr. Theobald is now inclined to make his *An. Walkeri* a synonym of this, an opinion in which I cordially agree. The larvæ of this species undoubtedly live through the winter in Italy, but, being mainly a sylvan species, it does not so often act as a carrier of malaria.

3. *An. ferruginosus* (Wied).

For description *vide* H. B., p. 329.

This name should, I think, sink as a probable synonym of *An. bifurcatus*, nothing corresponding to the small differences noted having come to hand.

4. *An. nigripes* (Staeger) = *An. plumbeus* (Halliday).

For description *vide* H. B., p. 330, or M., I., p. 201.

I took this species in a shop near the Helford River, Cornwall, last year, but could not discover any larvæ. The differences between this and *bifurcatus* do not seem sufficient to warrant considering it as anything more than a dark variety of that species.

5. *An. Aitkeni*, James. Monog., III., p. 22.

Like *An. nigripes*, is darker, but closely resembles *bifurcatus*. It appears, however, to be distinct, the hinder fork-cell being not much more than half the length of the anterior. The legs too want the knee-spots and the pale spot at the base of the first tarsal. The palpi also are uniformly dark.

Habitat.—On the frontier of Goa, and in Karwar, in India.

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* In the above and following descriptions "H. B." refers to the paging of the second edition of my "Handbook of the Gnats or Mosquitoes," and "M." to Mr. Theobald's Monograph.

6. *An. Algeriensis* (Theob.).

Identical with *An. bifurcatus*, except that it is smaller, and the cross-veins are arranged closely *seratim*, instead of alternate. I can see no valid reason whatever for separating this form, as *bifurcatus* is remarkably variable both in size and venation. It is indeed noteworthy that specimens of this species, as well as of *An. maculipennis*, hailing from southern latitudes never approach the size of the huge gnats that come from Canada, and I have seen Italian specimens quite as small as those of this form.

7. *An. Eiseni* (Coquillett).

Journ. N. Y. Entomolog. Soc., x., p. 129.

Resembles *An. maculipennis*, but the wing has a patch of whitish scales on I. before its middle, and the apical fourth of the hind tibiæ is yellowish. *Length :* 3·5 mm.

Habitat.—Aguna Gautemala (2,000 feet).

8. *An. immaculatus*, Theob. M., III., p. 23.

This species has the wings quite unspotted, but yellow throughout, and is generally of this tint, though the tarsi are sufficiently darker to show apical ochreous banding. The ♀ palpi are short for an *Anopheles*, and rather densely scaled, and show some indications of paler apical banding. Head yellowish behind and greyish in front, with a white frontal tuft. *Length :* 4 mm.

Habitat.—Goa, Portuguese India.

9. *An. stigmaticus*, Skuse.

For description, *vide* H. B., p. 327, or M., I., p. 207.

10. *An. annulipalpis*, Arribal.

For description, *vide* H. B., p. 327, or M., I., p. 211.

11. *An. punctipennis*, Say.

For description, *vide* H. B., p. 322, or M., I., p. 189.

12. *An. crucians*, Wied.

For description, *vide* H. B., p. 324, or M., I., p. 204.

Has shorter legs than *An. punctipennis*, and has VI. white, with three black spots.

13. *An. punctipennis*, Say, " *Var A*," Theob.

This form, which is figured on Plate VI., fig. 24 of Mr. Theobald's Monograph, but does not appear to be noticed in the text, has a large additional yellow spot inside those of the typical insect. It certainly looks distinct.

14. *An. pseudopunctipennis*, Theob.

For description, *vide* H. B., p. 323, or M., II., p. 306.

15. *An. Franciscanus*, Kellog, MS. name.

Wing with the costa sooty, but for a sulphur-yellow spot on the absolute apex, and another small one opposite the anterior fork-stem; these spots extend to I., but this vein has two additional white areas at the origin of II., and at its base, where, indeed, all the veins but the costa are pale, though the rest of the wing is mainly dark; fringe rather indistinctly spotted at all longitudinal junctions. Tarsi rather pale brown, unbanded. Thorax brown, with three longitudinal paler ground markings and clothed with scattered white hairs. Ground colour of abdominal segments black, pale at the base, producing indistinct banding, and clothed with silvery hairs.

Head black, with hardly any frontal tuft; palpi of ♀ dark brown, with three narrow ill-defined pale bands on the three outer articulations; those of ♂ pale brown, with tufts of darker bristles, but no definite adornment. Pleuræ marbled with white and brown. Tibiæ and femora with narrow pale apices. *Length:* about 4 mm.

Habitat.—San Francisco, California.

16. *An. Lindesayii*, Giles.

For description, *vide* H. B., p. 323, or M., I., p. 203.

17. *An. gigas*, Giles.

For description, *vide* H. B., p. 316, or M., II., p. 308.

GENUS STETHOMYIA, Theobald.

Journ. Trop. Med., v., p. 181, 1902.

This genus presents two very easily recognised characters, viz., there is a band of flat imbricated scales along the middle of the head, and the prothoracic lobes are crowned with curious nipple-shaped prominences. Only two species are at present known. The following is Mr. Theobald's short diagnosis of the genus :—

" Thorax and abdomen hairy and bristly, prothoracic lobes mammillated, wings with narrow lanceolate scales, and the head with a median patch of flat scales; palpi of the ♀ very thin. In both the known species the auxilliary joins the costa inside the cross-veins, and the anterior fork-cell is twice the length of its stem, and much longer than the hinder."

1. *Stethomyia Nimba*, Theob. M., III., p. 62.

Wings unspotted, clothed with deep brown scales; cross-veins arranged 2, ‖ 4, 3 external to them. Tarsi black unbanded. Thorax black, nude, with a brilliant silvery median and lateral grey bands. Abdomen black, with dingy hairs, and showing tesselated markings in certain lights; legs exceptionally long and thin. Prothoracic lobes large and black, except in the centre, and in certain lights on the small nipple.

Head black, with long narrow fork-scales on the nape, and a median patch of flat white scales in front, with a grey line round the eyes; palpi black, very thin and smooth, longer than the proboscis in both sexes; the end joint of the ♂ club very short; proboscis black and slender.

Prothoracic lobes black, surmounted by small nipple-shaped projections, which are armed with a few bristles; pleuræ scutellum and metanotum brown, unadorned. Legs deep brown, paler at the base; halteres with pale stem and dark knob. *Length:* 4·3 mm.

Habitat.—British Guiana and Para.

This species closely resembles *An. bifurcatus* and *nigripes*, but may easily be distinguished by its generic characters. Dr. Low strongly suspects that it is an important agent in the dissemination of malaria in that part of the world.

2. *Stethomyia fragilis*, Theob. MS. name.

Wings greenish brown, unspotted. Tarsi dull brown, unbanded. Thorax rather pale, greenish brown, unadorned; nude but for a few long black hairs. Abdomen rather darker than the rest of the insect, unadorned; nude but for a few bristly black hairs. Prothoracic lobes smaller at the base, but with a larger nipple than in *S. nimba*.

♂.—Head greyish, with a few pale brownish fork scales and numerous long black hairs; the margins of the eyes and a compact double frontal tuft, creamy. Palpi pale brown, quite silvery in certain lights, darker on the well-marked club, clothed with smoothly lying flat scales. The proboscis has the appearance of being nude of scales and clothed only with very short black hairs; it is much longer than the palpi. Pleuræ and metanotum pale greenish brown; legs rather dark, smooth and spidery; halteres brown with large knobs. Venter greenish brown, rather thickly beset with long brown hairs. *Length:* 3 mm.

Habitat.—Kuala Lumpor, Malay Peninsula.

GENUS CYCLOLEPPTERON, Theob.

For definition, *vide* H. B., p. 330, or M., II., p. 312.

The egg cases rupture at one end by a spiral tear, and the habits of the larvæ generally resemble those of other *Anophelinæ*.

1. *Cy. Grabhamii*, Theob.

For description, *vide* H. B., p. 331, and M., I., p. 205, II., p. 312, also in III., p. 56.

2. *Cy. mediopunctatum*, Luth MS. (M., III., p. 60.)

Wing with the membrane marked with three spots which involve the costa, and are here clothed with black scales, forming very prominent black spots over the pigmented areas; the rest of the dark costa is marked with about ten brilliant white dots, of which there are also several on I., there are several patches of the generically characteristic round, inflated black scales about the bases of the forks, and grouped into spots on the other veins; fringe, pale, unspotted. The last tarsal joints of all the legs are yellow, the remaining joints elaborately banded with yellow and brown. Thorax reddish brown, marked with two large dark eye-like spots, and a large dark median spot extending onto the scutellum.

Abdomen deep brown, with golden hairs and lateral tufts of mixed black and golden scales.

♂.—Head dark with creamy forked scales in the middle, and a yellow double frontal tuft; palpi with the two joints of the club golden with black basal bands, with rich golden tufts; their basal portion black. Pleuræ brown with two curious, twisted, grey marks; legs deep brown spotted and banded with golden yellow. Venter scaly, especially so on the apical segments. *Length:* 5 mm.

Habitat.—Brasil.

I know of no other species in which the wing membrane itself is spotted, except *An. stigmaticus*, Skuse, and its entire ornamentation is of so exceptional a character that nothing else is likely to be confused with it. The mere fact of the middle feet being yellow separates it from all other species, except *Bigotii.*

GENUS MYZOMYIA, Blanchard.

= *Grassia*, Theob. *Journal Tropical Medicine*, 1902, p. 181. The name having been changed, owing to *Grassia* having been already used as a generic term.

Thorax and abdomen hairy, though there may be a few narrow curved scales on the front of the mesonotum. Wings with long narrow scales on the sides of the veins, which stand rather far apart, giving a characteristic straggly look to the veins, as seen under the microscope; always more or less spotted in contrasted colours. Usually rather small species, with long thin palpi.

1. *My. funesta*, Giles. For description, *vide* H. B., p. 318, or M., I., p. 178.

It should be noted that the coloured figure of this species (fig. 13, Plate IV.) in Mr. Theobald's Monograph, if it be drawn from a specimen of this species at all, represents a most abnormal one, which was provided with a large additional pale spot near the base of the wing. All the specimens I have examined have an apical and three, not four, pale spots.

2. *My. picta* (Loew). *Diptr. Beitr.*, 1845. = *My. leptomeres*, Theob., M., III., p. 38.

Wing generally dark, the apex yellow with a small black spot, and marked also with two yellow costal spots; the fringe is spotted, but the long veins are mainly black-scaled, with the notable exception of a characteristic white-scaled area at the base of I. Legs, including the tarsi, black, unbanded. Thorax, brown with pale, narrow, hair-like scales and golden hairs. Abdomen blackish with golden, hair-like scales.

♀.—Head dark brown, with the forked scales grey above and black at the sides of the head; palpi, black, the apex with a broad white band, and two other narrow apical bands on the next joints; proboscis, pale at the tip. Pleuræ with grey sheen, scutellum pale brown; halteres with pale stem and fuscous knob. *Length:* 3 mm.

Habitat.—India, Syria.

This species answers almost completely to Loew's description of *An. pictus.* The palpi, it is true, do not correspond, but it is clear from Loew's description, that it refers to a ♂, whereas the present species is based on a single ♀, and Loew's description of them is very much what one would expect to meet with in the ♂ of Theobald's new species. Both, too, are Asiatic forms, though taken at widely different parts of the continent; and on the whole it appears to me preferable to recognise this as *pictus* to originating a new name, especially, as the types of Loew's species being no longer traceable, it must otherwise encumber nomenclature as a purely nominal species. It is clearly a very rare insect.

3. *My. Rhodesiensis* (Theob.).

For description, *vide* H. B., p. 321, or M., I., p. 184.

4. *My.*(*?*) *hebes* (Donitz),

Beit. z. Kennt. d. Anoph., p. 84, 1902.

This small species most resembles *M. Rhodesiensis*, Theob., with only the apex of the wing and three small spots on the costa to relieve its sombre tinting, as "the remaining veins are principally covered with dull brownish-grey scales, bestrewn with a few lighter whitish places; V. is pale, save at the base, at its bifurcation; and a marginal dot; there are also pale patches over the cross-veins and the bases of the fork-cells. The "second" costal spot (whichever that may be) is said to be the largest, whereas in *Rhodesiensis* all three are of about equal size. The most distinctive character of the species recorded appears to be that of the palpi (♀ ?) which appear to be mainly white. "The first and second palpal joints covered with white scales. The end of the third joint is dark, the fourth joint quite white," and elsewhere "terminal joint white," but whether his "first" joint be basal or apical is left to the choice of the reader. The description, which is probably drawn from a specimen preserved in spirit, while overladen with details of the anatomy of the veins, which we know are too variable to be worth the pains of recording, leaves in doubt many essential points, so that it is not clear whether the tarsi are banded or not, but the presumption is that they are not obviously banded. The internal fringe of the wing is said to be "piebald," and the very hazy figure seems to indicate that there are pale patches at every longitudinal junction, including that of VI.

Measurements.—Head with proboscis, 2·2 and 1·7 mm.; thorax and abdomen, 3·4 mm.; wings, 2·7 and 2·5 mm.

Habitat.—Dar es Salaam, East Africa.

5. *My. Christophersi* (Theob.). M., III., p. 27.

An. Christophersi, Theob. *Pr. R. Soc.*, lxix., p. 378, *et* Giles, 2nd edit., p. 512.

An. Listoni, Liston (*nec mihi*), *Ind. Med. Gaz.*, xxxvi., 12.

Wing yellow at the very apex, but black at the base, with three yellow interruptions (involving auxiliary and I.) less than half the length of the intervening black portions of the costa, and placed at fairly even distances; the external of the two middle pale spots extends obliquely inwards over the cross-veins, and the remaining long veins are variegated with black and yellow lengths, the former preponderating towards the costal, and the latter towards the inner margin; internal fringe dark, with the apex yellow, and pale interruptions of the same tint at all but the junction of VI. Tarsi umber brown, with mixed golden and brown scales, so arranged as to give faint indications of pale articular banding.

Head dark brown, with broad white upright forked scales in front, black ones behind, and a dense tuft of white hairs projecting forwards; palpi of ♀ with two fairly prominent rings and a pale tip, and the dark proboscis has also a pale tip. Halteres with pale red stem and dark knob. Legs completely dark brown, with bronzy reflections. *Length:* 2·5 mm.

Habitat.—Duars, and North Canara District, India, and Perak.

This species was originally described by Captain Glen Liston, I.M.S., under the mistaken idea that it was identical with the form I had described as *An. Listoni*, but which I now consider to be merely a large variety of my *Culicifacies*, manuscript notes of whose description had been sent to him by me. His descriptions and types, however, correspond with Mr. Theobald's *Christophersi*, and as the name "*Listoni*" had been already published by me, it cannot, even apart from the confusion its use would involve, stand, and the species he referred to should appear as *Myzomyia Christophersi* (Theob.). It differs from my *funesta* in possessing an additional pale spot at the base of the wing, and from the entire *Culicifacies* group in the internal wing-fringe having pale marks at every longitudinal junction but that of VI.; while *M. Turkhudi* and *M. Hispaniola* differ in having the apex of the palpi of the ♀ dark.

6. *My.* (?) *impuncta* (Dönitz).

In this species the wing is generally pale with but few black spots on the veins, and the light parts of the fringe opposite the long junctions longer than the dark ones; the costa shows three small black spots on a pale ground, and there are probably basal dots also. The tarsi appear to be unbanded, and also the palpi, but practically nothing but the wing is described. Dönitz's figure shows three black spots on VI. In all probability it is distinct, as I know of no other wing that corresponds well to the figure, which is a fair one, but it is, of course, impossible to say to what genus it may belong.

7. *My. Culicifacies* (Giles).

For description, *vide* H. B., p. 317.

The description of this species was drawn up in the dawk bungalow at Hoshangabad, where I first found it, and as I had several specimens of both sexes, the description in my Handbook is correct, apart from the detail of the abdomen and thorax being not scaly. Unfortunately, through some mistake, the specimens that were set aside as types at the museum included a number of males of the form subsequently separated by Liston as *My. Turkhudi*, and, owing to this, the descriptions in the Monograph of the ♂ *Culicifacies* really refer to the ♂ of that species, and not to the present form.

7*a*. *My. Listoni* (Giles), *nec* Liston.

I now regard this as merely a large variety of *My. Culicifacies.* The differences between the two forms are sufficiently indicated in the diagnostic table.

7*b*. *My. Indica* (Theob.).

Is now recognised by Mr. Theobald as a synonym of *My. Culicifacies*, and the name therefore sinks.

8. *My. Turkhudi* (Liston). *Ind. Med. Gaz.*, December, 1901.

Wing with the black costa yellowish white at the apex, and with five pale interruptions (including two large basal dots). Opposite the middle of the three large spots, which are about two-thirds as long as the dark portions separating them, are progressively longer pale marks on the other long veins, so as to form a broad band across the wing; but, on the whole, the veins show more dark than pale scaled portions; there are prominent pale interruptions of the internal fringe at every longitudinal junction but that of VI. Tarsi uniformly dark, unbanded. Thorax dark brown, with pale yellow hairs so arranged as to show some median and lateral linear adornment. Abdomen dark brown, with dull golden hairs. Palpi dark at their tips.

Head clothed with dark upright forked scales, and with a small creamy frontal tuft. Palpi of ♀ black, with three prominent white bands, but dark at the tip; those of the ♂ clubbed, brown, with the apical joint clothed with short, dark, bristle-like hairs, two pale bands on apex and middle of the next joint, and a third on the apex of the following joint; proboscis deep brown, pale at the apex. Pleuræ clothed with brown scales, often tipped with white; halteres pale, with darker knob; legs dark brown dorsally, but for a few pale scales on the tips of all the tibiæ and femora, paler below. *Length*, 5 mm.

Habitat.—Elichpur, India.

This species differs from all the other members of the *Culicifacies* group, except *Hispaniola*, in having the tips of the palpi black, and from the latter species in having III. mainly black-scaled. In Mr. Theobald's Monograph the male is described as that of *Culicifacies.*

9. *My. Hispaniola*, Theob. M., III., p. 49.

Closely resembles *M. Turkhudi* (Liston), but differs in having one of the two large basal dots of that species wanting, so that it shows only an apical and four pale costal spots, and III., instead of being mainly black, is all yellow-scaled, except at the base and apex; the internal fringe has pale markings at every longitudinal junction but those of V. and VI. Also the palpi have the black apex much longer, and the pale banding narrower. *Length.*—5 mm.

Habitat.—Spain and Teneriffe.

10. *My.* (*?*) *aconita* (Dönitz).

Beit. z. Kennt. d. Anoph. p. 70, 1902, also M., III., p. 30.

Wing with the apex pale, and the black costa interrupted by five pale markings (including two basal dots); of the three prominent spots the two outer are twice as large as the third, but neither are more than half as long as the black parts separating them; in the remaining long veins the black-scaled portions rather preponderate, but III. is pale for the greater part of its length; the internal fringe appears to be mainly pale, with dark patches opposite each cell. Tarsi dark, with some indications of articular banding. Thorax yellow (in alcohol), with some signs of linear adornment. Abdomen not described.

Head with a white frontal tuft; palpi dark, with pale apex, and, as I gather, three pale bands. Halteres with pale stem and darker knob. Legs uniformly dark. *Length* of head and proboscis, 2 mm., of trunk, 3 mm., of wing, 2·7 mm.

Habitat.—Sumatra, Java, Willem Island.

This species was described by Dr. Dönitz from specimens preserved in spirit, and hence is necessarily incomplete and uncertain, so that it cannot be placed with any certainty. It is a good deal like *My. funestus*, but the innermost spot on the costa is much smaller than the others, in place of being nearly equal, and if the tarsi are, as appears probable, banded, it can be easily distinguished: it has one less wing-spot than *Christophersi*, and less than *leptomeres*, and so is probably distinct. It is needless to say that its generic position is merely a guess.

11. *My. longipalpis*, Theob. M. III., p. 37.

Costa pale at very apex, dark at base, with four nearly equal, small, yellowish spots, the two inner of which are much longer on I.; few other pale spots except at the forkings and cross-veins; and two lengths on V. and VI. each; fringe pale at apex, and at all long junctions except VI. Thorax cinereous in the middle, brown at sides. Legs black, paler at their bases; hind tarsi only, with narrow pale articular bands. Abdomen black with brown hairs. Palpi long and thin, black, with the apex and three narrow rings white.

Is not much like any other species except *Pyretophorus cinereous*, but can easily be distinguished by the much larger proportion of dark-scaled parts on the veins and by having but three, instead of four, white rings on the palpi.

12. *My. Albirostris*, Theob. M., III., p. 24.

Wing with the costa black, showing three almost equal yellow spots, as well as a pale apical area, and a single basal dot; the fringe is pale at the apex, except at the second posterior junction, and its inner border shows pale interruptions at each longitudinal junction, that opposite VI. being largest; with the exception of the greater length of IV. and a few spots on the other veins, the rest of the wing is pale. Tarsi with minute apical bands. Thorax slatey-grey, with golden hairs so arranged as to give some indications of median and lateral markings. Abdomen nearly black, with golden hairs. Proboscis whitish for nearly its apical half. Is one of the smallest known species.

Head deep brown, with white forked scales in the middle, black at the sides; antennæ brown, with some grey scales on the basal joints; palpi with the greater part of the two last joints white, forming white ends, nearly as long as the white part of the proboscis, interrupted only by a narrow white band; in the ♂ the two last palpi joints are much swollen and brown. Legs dark brown, with pale apices to the joints. Halteres with pale stem and fuscous knobs. *Length*, 2·5 mm.

Habitat.—Malay States, in May.

13. *My. Ludlowii*, Theob. M., III., p. 42.

Wing generally pale, including the apex and absolute base, but the dimensions of the dark spots exceed those of the pale ones on the intervening space, though the two outer pale spots are of considerable size. The outermost black spot is very small, no more than a third the length of the next, or a quarter of that following, while the innermost large black spot is, again, less than three times the length of the apical one; there are in all six black spots, including two small basal dots. There are black dots on the apices of all the longitudinal branches, and some elsewhere, but the pale parts greatly preponderate. The internal fringe is spotted. The tarsi are prominently banded on the articulations. Thorax, fawn-coloured with pale hairs, and faintly indicated linear adornment. Abdomen, brown with narrow, curved, hair-like scales and pale border bristles.

Head brown, with dark, forked scales, and narrow, pale ones, and a scanty whitish frontal tuft; palpi of ♀, with the tip pale and two narrow rings, the outer of which is separated from the pale tip by only a very narrow dark, interval; proboscis pale at tip. Legs brown, the long joints, especially of the hind legs, being prominently spotted with yellow: pleuræ brown, mottled with grey.

Length.—4 to 4·1 mm.

Habitat.—Luzon, Philippine Islands, April.

Much resembles *M. Rossii* (Giles), but may be distinguished by the yellow spotted legs, and the remarkably narrow, black band following the white tip of the palpus.

14. *My. Rossii* (Giles).

The very extensive pale base of the wing of this species, and the marked preponderance of the pale spots, form an excellent distinguishing mark of this species. As Grassi's *superpictus* is not only specifically but generically distinct, there can be no longer any difficulty in separating it from that form. It is by no means a typical *Myzomyia*, as there is a well-marked tuft of white, curved and spindle-shaped scales on the front of the thorax, as well as small apical patches of spindle-shaped scales on the two last abdominal terga.

15. *My. Lutzii* (Theob.).

For description, *vide* H.B., p. 303, or M., I., p. 177.

16. *My. tesselata* (Theob.).

For description, *vide* H.B., p. 305, or M., I., p. 175.

17. *My. punctulata* (Dönitz). Insect. Borse, 1901, p. 37.

A specimen which has been sent to the museum shows that this species is distinct from Theobald's *An. tesselatus*, the name of which he relinquished under the idea that it must be synonymous with Dönitz's previously described form. The dark-scaled parts of the veins are proportionally much larger in *punctulata*, and there are but three in place of four dark spots on VI. The hind foot wants the obvious pale tip to the last joint, and the thorax the characteristic eye-shaped markings. Lastly, the proboscis is only pale tipped, whereas in *tesselata*, most of its outer half is pale, but for a narrow black band near the tip.

18. *My. Leucophora* (Dönitz).

For description, *vide* H.B., p. 312, or M., II., p. 307.

19. *My. elegans*, James. M., III., p. 51.

Wing dark, with a large white apical spot, and six pale interruptions of the black costa (including two basal dots) ; the dark interval just within the cross veins being, at least, twice as long as either of the others ; the other long veins being black, interrupted by a large but rather variable number of white dots ; the fringe entirely pale at the tip, but for a small black patch opposite the anterior fork-cell, and with exceptionally broad pale marks at every longitudinal junction (including that of VI.).

Thorax clothed with white hairs and a few creamy lanceolate scales, and showing two dark eye-like spots, as well as linear adornment. Abdomen black, thickly covered with golden hairs, but nude of scales. Tarsi dark, speckled with white, with white articular bands, the hind legs having in addition, a characteristic broad white band on the tibio-tarsal joint.

Head with broad white forked scales in front and dark ones behind, and scanty white frontal tuft ; palpi black, with white tip and four white bands, the innermost being narrow, and the three outer broad and equal. Legs black, profusely speckled with white scales. Halteres with the knobs densely clothed with white scales. *Length.*—Not mentioned.

Habitat.—Karwar, Bombay Presidency, India.

This species, which may possibly belong to *Nyssorhynchus*, may be most easily recognised by the large black costal interval inside the cross-veins. It most resembles the *Leucophyrus* of Dönitz, but his has the longest dark patch outside the cross-veins ; it is also not unlike *Nyss. Stephensi*, but has four instead of three bands on the palpi, and the wing much more liberally dotted with white on the long veins. Still Mr. Theobald thinks it may possibly be only a variety of Dönitz's species.

GENUS PYRETOPHORUS, Blanchard.

= *Howardia*, Theob.
Compt. Rend. Soc. de Biol., Paris, xxiii., p. 795, Blanchard.
Journ. Trop. Med., v., p. 181, Theobald.

As will be noticed, the name of this genus has also been altered by Blanchard, on account of previous use. It is practically *Myzomyia* with more or less of the thorax scaly, and the scales of the wing-veins arranged in a less straggling manner.

Thorax partly scaly and partly hairy. Abdomen hairy, without scales, except on the external genetalia. Wing-scales lanceolate, generally long and narrow, but sometimes small. Palpi moderately densely scaled.

1. *Py. costalis* (Loew) = *An. Gambiæ*, Giles = *An. gracilis*, Dönitz ?

For description, *vide* H. B., pp. 308 and 511, or M., I., 157 and III., p. 74.

This species proves to be extremely variable, the number even of costal spots not being constant, some other variations being at least as apparently different as my *An. Gambiæ*.

2. *Py. Merus* (Dönitz).

Beit. z. Kennt. de Anoph., p. 77. M., III., p. 79.

Wing pale at apex and base, with six black spots (including two basal dots) larger than the pale intervals; of the four large black spots the inner is much the largest, the next in size being that following it towards the apex, and neither of these is continuous on II., while the outer and inner ones extend evenly to it; the pale and dark parts of the remaining veins are about equal, and the pale fringe has dark patches opposite each cell. Tarsi dark, with prominent pale articular bands. Thorax reddish-grey, as to ground colour. Abdomen, with the dark chitin of the segments marked with a pair of pale spots before, and a faint median line behind.

Head dark, with greyish scales and white orbits; palpi with the end joint all white, or sometimes showing a narrow black ring, as well as white articular bands. The femora and tibiæ have light spots on a dark ground on their outer and extensor sides. *Measurements.*—Head and proboscis, 2·8 mm.; thorax and abdomen, 4·5 mm.

Habitat.—East Africa, Dar es Salaam; S.W. Africa, Franzfontein.

This appears to be a distinct species; most resembling Theobald's *cinereus*, but distinguishable by the elaborate decoration of the legs.

3. *Py. Cinereus* (Theob.). = *An. Kumassii*, Chalmers.

For description, *vide* H. B., p. 309, or M., III., p. 161.

The description of the wing in my Handbook is wrong, as it overlooks the presence of an additional pale spot near the base of the wing, and the presence of indistinct spotting of the fringe at some of the long junctions. The figure is, however, correct as to the other details of the wing.

On comparing the two descriptions I think there can be no doubt that *An. Kumassii*, Chalmers, is synonymous with this species, and that that name should therefore be dropped.

4. *Py. Pitchfordi*, Power. MS. name.

Wing clothed with narrow lanceolate scales; costa black at apex, pale at absolute base, with three large yellowish spots, approaching the dark parts in length, and two basal dots; rest of veins mainly pale, but with several longish black marks; notably two on VI.; fringe spotted at all long junctions. Legs dark but for apical femoral and tibial spots, and the tarsii minutely apically pale-banded. Thorax dark with a broad band of white bloom in the middle, and clothed with hair-like yellow scales behind, and creamy, narrow, curved ones in front. Abdomen black, clothed both dorsally and ventrally with long golden hairs. The black scales near the fork of V. on the wing are blunt-ended.

♀ Head black, with a few black forked scales behind and clavate white scales between the eyes, succeeded by white spindle-shaped scales on the frons and a rather scanty double white frontal tuft; palpi moderately densely black-scaled, the outer fourth of the appendage white, with a narrow black band, and a smaller white band nearer the base proboscis black, with yellow tip; antennæ with a long second joint clothed with white scales. Pleuræ mostly fuscous. Halteres with densely black-scaled knobs. A very slenderly-built, dark-looking mosquito. *Length*, about 4 mm.

Habitat.—Zululand, 80 miles N. of Eshowe, in bush country, at an elevation of 1,500 feet. This valley is said to be notoriously malarious, according to Mr. Power.

5. *Py. superpictus* (Grassi).

For description, *vide* H. B., p. 310, or M., I., p. 151.

6. *Py. Marshallii*, Theob. M., III., p. 77.

Wings with the costa jet black, interrupted by six creamy spots (including two basal dots, which do not extend to the other veins). The first and third spots from apex extend evenly onto I., while the other two large spots are broken on it; internal fringe with pale spots at all the longitudinal junctions. Tarsi deep brown, with minute pale apical banding. Thorax slatey grey, with traces of linear adornment and grey, narrow, curved scales. Abdomen black, with brown and dull golden hairs.

Head black, with the fork-scales gray in front, black behind, and a double grey frontal tuft; *palpi black, with a broad, white apical band, another of the same width close to it, and a small one towards the base of the palp.* Legs deep brown, with apical femoral and tibial spots. *Length*, 3·5 to 4 mm.

Habitat.—Salisbury, Mashonaland, April.

Most resembles *P. costalis* (Loew), but may be distinguished by the ornamentation of the palpi.

7. *Py. Jeypurensis*, Theob. M., III., p. 66.

Wings with the costa black, marked with four pale spots, two large ones on the apical half and two small ones near the base; occasionally traces of a fifth spot between the basal and apical pairs of spots; there are numerous spots on the other long veins, and the internal fringe is spotted. Legs nearly black, with indistinct narrow apical tarsal banding. Thorax cinereous in the middle, dark at the sides, clothed with pale, narrow, curved scales. Abdomen brown with golden hairs.

Head with fork-cells creamy grey in the middle, dark at the sides;

palpi black, with broad white apex and two pale bands; proboscis dark, but pale at the end. *Length*, 4 mm.

Habitat.—Jeypur, Rajputana, India.

This specimen has some resemblance to *Culicifacies*, but can easily be distinguished by the spotted wing-fringe, as well as by the indistinct tarsal banding and the character of the thoracic scales. The larva has plumose frontal hairs, and the palmate tufts have large folia with very jagged sides; they frequent paddy fields, but are also found in streams.

8. *Py. minimus*, Theob.

Resembles generally *Myzomyia funesta*, Giles, but the long veins, with the exception of the costa and I., show a much larger proportion of pale-scaled lengths. The fringe, too, is spotted at all the long junctions, and there is a patch of lanceolate white scales on the front of the mesonotum, projecting forwards over the nape.

9. *Py. Chaudoyei*, Theob. M., III., p. 68.

Wing with the costa pale, marked with five black spots, smaller than the white parts separating them, the largest of which is opposite the posterior cross vein, the outermost subapical, and the innermost close to the root of the wing; the large, middle dark spot extends onto II., and there are a number of other black lengths on the otherwise pale veins, while the pale fringe is more or less darkened opposite the cells. Tarsi deep brown, unbanded. Thorax bright brown, with golden narrow, curved scales. Abdomen dark, with golden hairs; in the ♂ the ground membrane is decorated with a median pale line and crescentic lateral markings.

Head with the fork-scales black behind, creamy in front, and some flat ones on either side of a bare median line in front; palpi deep brown, black at the apex, with three pale bands; proboscis dark throughout. Pleuræ chestnut, legs dark, with pale knee and tibial spots. *Length*, 4·5 to 5 mm.

Habitat.—Touggourt, Algeria, on the Sahara, replacing *C. pipiens* in the local fauna in June. Sporozooites have been noted in this species.

The unbanded tarsi at once distinguish this from *superpictus*, *Rossii*, and others that most resemble it.

10. *Py. Palestinensis*, Theob. M., III., p. 71.

Closely resembles *P. Chaudoyei*, Theob., differing only in the wing being generally darker, the proportion of dark being usually greater than that of the pale spots on the costa, and the dark spot opposite "3" proportionally larger; different specimens, however, vary greatly in the proportional size of the dark and light spots, but a constant difference appears to be that there are two dark spots on VI., one of which is very long, in place of the three short ones of *Chaudoyei*. The head differs in possessing a very prominent double tuft, and the scales on the frons are falciform, not flat. The scales on the thorax, too, differ, being large, rather broad, and obovate, quite different from the hair-like scales of *Hispaniola* and *Turkhudi*, while the unbanded tarsi at once differentiate it from Grassi's *superpictus*. *Length*, 4·5 mm.

Habitat.—Beyrout, Syria; the larvæ were found in a runnel of water and in semi-stagnant pools in the river bed. Miss Bate also found this species everywhere in the plains of Cyprus, and to 4,000 feet at Phini.

11. *Py. atratipes* (Skuse).

For description, *vide* H. B., p. 324, or M., I., p. 208.

GENUS MYZORHYNCHUS, Blanchard.

= *Rossia*, Theob.
Comp. rend. Soc. Biol., Paris, xxxii., p. 795, Blanchard.
Journ. Trop. Med., 1902, p. 181, Theobald.

Thorax with hair-like scales. Abdomen with ventral and a few apical scales, and a ventral apical tuft; there are no lateral scale tufts to the segments. Wing-scales generally broadly lanceolate, sometimes short and broad. Palpi and proboscis bushy with densely packed scales in both sexes. The name of this genus has also been altered on account of previous generic usage of the word Rossia.

The wings are very beautiful under the microscope on account of the luxuriance and regular arrangement of the large lanceolate scales, and are most characteristic in appearance. Most of them are non-domestic species, but *M. Sinensis* certainly habitually enters houses, and so does *barbirostris*. The larvæ usually have much-branched frontal hairs.

1. *Mzr. paludis* (Theob.).

For description, *vide* H. B., p. 296, or M., I., p. 128.

2. *Mzr. Mauritianus*, De Grandpre *et* De Charmoy.

For description, *vide* H. B., p. 296, or M., I., p. 129 (as *An. similus*).

3. *Mzr. Ziemani* (Von Grûnberg).

Zool. Anziger., Bd. xxv., No. 677, July 21, 1902, Von Grûnberg.

Wing with the densely black-scaled costa relieved only by a single, almost punctiform spot, limited to the costa, beneath the middle, and a larger, rather ill-defined spot at the apex, extending to the anterior branch of II., as well as a few other spots on the wing-field. Last two hind tarsals and two-thirds of the third joint white, remaining tarsal joints minutely pale ringed. Thorax deep brown, with scattered lighter bristles; on the fore half are median and lateral black lines, the latter duller, but better defined. Abdomen not described.

Occiput dotted with black erect scales, frons with a large white tuft; palpi densely black-scaled, except the apical joint, which is white; third joint with a basal, and fourth, with basal and apical pale rings. A tuft of bristles springing from either side of the prothorax projects over the occiput. Legs with the femora clear brown. *Length*, of the body, 5·5 mm.; of the palpi, 2·2 mm.; of the wings, 4·5 mm.

Habitat.—Wuri on the Cameroons. It is said by Dr. Zieman to be undoubtedly concerned in the transmission of malaria.

4. *Mzr. Coustani*, Laveran.

Archives de Parasitologie, Paris, 1902, p. 359.

From the descriptions this species seems to be distinct from, but very like *Mzr. Ziemani.* The wings seem almost the same, though in the present form the subapical spot extends to both branches of II., and then, missing III., reappears on anterior IV. What, however, best distinguishes them are the ♀ palpi, which are absolutely unadorned. The tarsal banding also appears to be broader, but confined to the upper joints. *Length*, including proboscis, 10 mm.

Habitat.—Madagascar and Reunion. The parts of the islands, in which it is common, are said to be notoriously malarious.

5. *Mzr. Sinensis* (Wied).

For description, *vide* H. B., p. 305, or M., I., p. 137-151, and III., p. 89-92.

I am strongly of opinion that under this name should be included the various forms, varieties, or subspecies enumerated below, viz. :—

An. vanus, Walker ; *An. nigerrimus*, Giles ; *An. Indiensis*, Theob. ; *An. pseudopictus*, Grass ; *Mzr. minutus*, Theob., and *Mzr. alboannulatus*, Theob.

The points which distinguish these will be found in the diagnostic table, but in practice it is very difficult to say where one begins and the other ends, and I strongly suspect that were I to attempt to sort any at all extensive collection of this "*Sinensis* group" I should probably arrange them differently as many times as I attempted the task.

It is to be noted that the form referred to as *An. annularis*, Van der Wulp, is now said to be identical with Walker's *An. vanus*, by Mr. Theobald, and will in future stand under that name. I could never understand why Mr. Theobald referred the form he speaks of under this name as Van der Wulp's species, as, whatever that may be, it certainly has white hind feet, his description stating that "the long hind tarsi are fuscous in the middle, with a white ring, and wholly white towards the end," so that Von Grûnberg's new species, *An. Ziemani*, from the Cameroons, answers very well to Wulp's description, and may very well be a synonym of his *An. annularis.*

Mr. Theobald's two new forms of this group, *Mzr. minutus* and *Mzr. alboannulatus*, do not appear to be any more distinct than the others, as in spite of its name, the recorded size of the former, which is 4·5 mm., shows it to be very much the same length as the others, and the only remaining difference is that the wing spots are white instead of yellow. *Mzr. alboannulatus* is at present only a manuscript name, certain specimens having been placed by themselves in the collection labelled with that designation, but I cannot see how they differ from the *vanus* form. That various local races differ somewhat is no doubt the case, but that they are specifically distinct I strongly doubt, and believe it would be better to sink all these names under the common designation of *Sinensis*, for far greater differences can be made out between admitted varieties of *Py. costalis* than can be shown to stand between these. In this connection it may be noted that *Mzr. Ziemani* is practically a white-footed *Sinensis*, and *Mzr. Coustani* a white-footed *barbirostris*. Are even these differences specific?

6. *Mzr. barbirostris* (Van der Wulp).

For description, *vide* H. B., p. 308, or M., I., p. 146, and III., p. 86.

This species has recently been found in the Malay States.

7. *Mzr. Umbrosus*, Theob. M., III, p. 87.

Closely resembles *M. barbirostris*, but is clearly distinct, having only a single costal spot, just inside the apex, and a more pronounced yellow and black apical fringe, no pale internal fringe spots, in being generally paler, and in having no scattered white scales on the wing-field. *Length.* —5 mm.

Habitat.—Penhang, Malay States.

8. *Mzr. Bancroftii* (Giles).

For description, *vide* H.B., p. 511, and M., III., p. 88.

Closely resembles *Mzr. barbirostris*, but has the apical spot larger and truly apical, while in *barbirostris* it is really subapical, and the other white costal spot is closer up to the base of the fork-cell than in that species, whereas, it is, if anything, inside the middle of the fork-stem. The basal dots, too, of *barbirostris* appear to be wanting, and there are prominent pale interruptions of the internal fringe at every longitudinal junction but that of VI. I doubt if it can fairly be considered as anything more than a variéty, though it looks different, and Mr. Theobald considers it distinct. *Length.*—7 mm.

Habitat.—Bupengary, Queensland.

9. *Mzr. albotæniatus*, Theob. M., III., p. 88.

Closely resembles *Mzr. barbirostris*, but it has distinct white hind feet, and the banding of the tarsi is much more prominent and distinct. With the exception of the costa and I., the long veins are much paler than in that species, being clothed with an intimate mixture of black and white scales except at the forkings, over the cross-veins, and in the middle of VI., where there are dense tufts of black scales, recalling the tufts of *An. maculipennis*.

10. *Mzr. pseudobarbirostris* (Ludlow).
Journ. New York Entomolog. Soc., x., p. 129.

This also resembles *Mzr. barbirostris*, but differs in being less intensely sooty black, the unbanded palpi looking rusty, owing to their scales having ferruginous tips. The femora and tibiæ, too, are plentifully sprinkled with white scales, instead of being entirely fuscous. The wing has III. mostly white, and its fringe pale-spotted at the junctions of I., II., and anterior branch of IV. *Length.*—5 mm.; including proboscis, 7 mm.

Habitat.—Hagonoy, Bulacan, and Luzon, in the Phillippine Islands.

GENUS ARRIBALZAGIA, Theob. M., III., p. 81.

This genus is closely related to *Myzorhynchus*, differing mainly in the abdomen being furnished with ventral lateral apical scale-tufts. The thorax is clothed with curved hair-like scales, and has a few narrow, curved ones in front. The clypeus is said to be of "peculiar form."

The genus includes but a single species.

1. *Arribalzagia maculipes*, Theob. M., III., p. 81.

Wings with very peculiar decoration, there being three pronounced dark patches, extending more than half across it, while the actual costa is marked with no less than ten small yellow dots ; the rest of the wing, including the internal fringe, is dark, with the exception of a few pale patches about the fork-cells. Tarsi black with prominent apical bands and some additional spots on the first two joints. Thorax brown, with hair-like golden scales, and some signs of linear adornment. Abdomen black, with deep brown and golden hairs, the dorsum nude, but each segment with an apical lateral tuft of black scales, intermixed on the hinder segments with a few white ones.

Head dark brown, with the forked scales brown and grey and indistinct pale orbits ; palpi densely black-scaled, with three narrow white bands and apex. Legs deep brown, banded and spotted with white. *Length.*—6·5 mm.

Habitat.—San Paolo, Brazil, Trinidad.

It will be noted that this species bears a strong but deceptive resemblance to *Cycloleppteron mediopunctatum*, the very peculiar wings being almost identical, but it can easily be distinguished by the entire absence of the characteristic inflated, round wing-scales of that species.

GENUS CHRYSTYA, Theob. MS. name.

This genus generally resembles *Myzorhynchus*, the character of the scaly adornment of the wing and of the thorax being practically the same, but the abdomen differs, for though it is also devoid of true scales on the dorsum, it is clothed with short stiff bristles, instead of the long hairs which characterise the other genus. The most striking peculiarity, however, is that dense tufts of long stiff bristles, blunt, or slightly clubbed at the end, project at right angles from the hinder border of the segments, giving it an appearance not unlike that of the larvæ of certain moths.

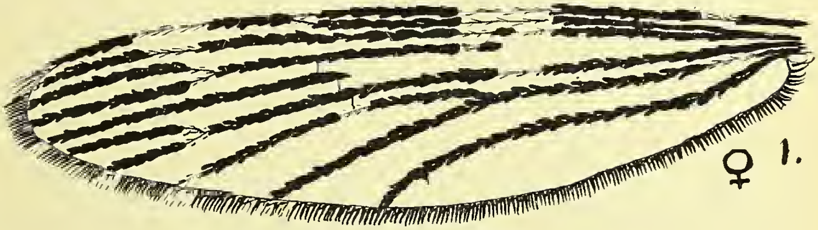
Only a single species is as yet known.

1. *Chrystya implexa*, Theob. MS. name.

Wing sooty, clothed with lanceolate scales, as in *Myzorhynchus* ; the black costa ferruginous at the apex, and interrupted by two prominent ferruginous spots, extending to I., with a third punctiform spot, limited to the costa, between them ; there is a fourth spot, or large basal dot, close to the root of the wing ; rest of the wing dark but for small pale spots at the basis of the fork-cells, two on V., opposite III., and at its base, and one or two dots elsewhere; fringe pale at apex and spotted at junctions of III., posterior IV., and rather indistinctly at both branches of V.

Last three tarsal joints and the apex of the second white on the hind feet; the other tarsi basally pale-banded. Thorax deep red brown, clothed with golden, curved, hair-like scales.

Abdomen sooty, clothed with short, stiff, brown bristles, and with dense tufts of thick, stiff, slightly curved bristles projecting vertically from the hinder borders of the sides of the segments. Femora and tibiæ elaborately banded.



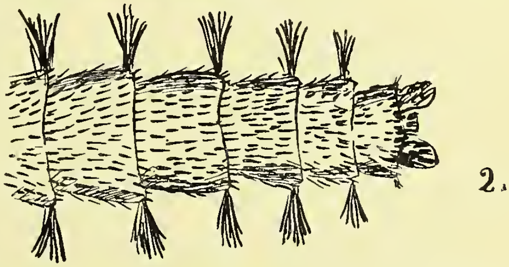


Fig. 1.—Wing of *Chrystya implexa*. Fig. 2.—Abdomen of *Chrystya implexa*.

Head pale-grounded; a triangular patch of golden fork-scales on the frons, and densely beset behind with black ones. Palpi and proboscis black, very densely scaled; on the part of the former remaining, there are two pale bands, one of them very close to the base. Pluræ marbled with lines of snow-white flat scales. Venter black, with white lateral spots on the hind part of the segments. *Length.*—About 7 mm.

Habitat.—Uganda, Cent. Africa.

GENUS NYSSORHYNCHUS, Blanchard.

=*Laverania*, Theob.
Compt. Rend. Soc. Biol., Paris, xxiii., p. 795, Blanchard.
Journ. Trop. Med., 1902, p. 181, Theobald.

Thorax with narrow, curved and fusiform scales. Abdomen scaly on the venter, and also on the dorsum of the apical segments, sometimes dorsal apical patches. Wing-scales bluntly lanceolate, short, some longer and narrower. Palpi densely scaled. Legs banded and spotted white, the hind tarsi usually with one or more pure white joints. The abdominal scaling is never prominent.

1. *Ny. maculatus*, Theob.

For description, *vide* H. B., p. 301, or M., I., p. 171, and III., p. 96. Mr. Theobald makes this the type species of the genus.

2. *Ny. Karwarii*, James. M., III., p. 102.

This species so closely resembles *N. maculatus*, Theob., that it may easily be mistaken for it, but differs in the upper joints of the legs being unspotted, but for an apical band on the hind tibia. Another point of distinction is that VI. has only two in place of three dark markings, and that the distal one of these is very long and close to its end.

Habitat.—Karwar and Goa, Western India.

3. *Ny. Willmori*, James. M., III., p. 100.

This is also much like *maculatus*, but the abdomen is more densely scaled, and the ♀ palpi have only three instead of four pale bands. On the fore and mid legs there are pale apical bands, and the legs throughout are spotted much as in *maculatus*.

Habitat.—Kashmir, 4,800 feet. Its larvæ were found in a clear puddle fed by a spring.

4. *Ny. maculipalpis* (Giles).

For description of ♂, *vide* H. B., p. 297.

Many specimens of this mosquito have now reached the museum, including the female.

♀.—Palpi with two broad white bands, one apical, and a third narrow one towards the base speckled white throughout. Antennæ with a long second joint sprinkled with white scales. The larva has four pennately compound frontal hairs, the middle pair the larger, and two shorter simple hairs.

Habitat.—India, Mauritius, Mashonaland.

The Indian specimens have the hind legs not quite so much banded, and vary a little in the wing, and are made a *Var Indiensis* by Mr. Theobald.

5. *Ny. Pretoriensis*, Theob. M., III., p. 99.

Closely related to *N. maculipalpis*, but the palpi are not mottled, are somewhat longer, and its two white apical bands farther apart. The hind tarsi also differ, the third joint having a small black patch near the base, whilst the first is mottled black and white, and has a broad white apical band like the second, so that only the last two joints are wholly white. *Length.*—5 mm.

Habitat.—Pretoria, appearing in February, and gradually becoming more prevalent, till in April it superseded the previously dominant *Myzomyia cinerea*, according to Dr. Theiler, who calls it "the black

Anopheles of Pretoria." The pale markings on the wing-fringe are large but ill-defined.

The larvæ have the frontal hairs all simple, the outer ones being short and the median long and thin, whereas in the Indian species, that so closely resembles it, they are all pennately compound.

6. *Ny. Jamesii*, Theob.

For description, *vide* H. B., p. 299, or M., I., p. 134.

It should be noted that the statement in my Handbook that the palpi are spotted in the same way as the legs is erroneous, as they are simply banded with pure white on the apex and on the apices of the next three joints.

The species referred to by Liston under the above name in his paper on the Indian Anophelinæ is not, however, this one, but my *Ny. fuliginosus.*

7. *Ny. Phillippinensis* (Ludlow).

Journ. N. Y. Entomolog. Soc., x., p. 128.

Closely resembles *Ny. Jamesii* (Theob.), but differs in the upper leg-joints being unadorned, with the exception of a pale patch on the apex of the tibiæ; in the absolute apex of the wing being pale instead of black; and in the palpi being golden brown instead of black, although similar in their markings, each having the end joint and the apices of the next three white, or, in other words, a long white tip and two bands. *Length*, including the proboscis, 5 mm.

Habitat.—San José, Abra, and Luzon, Phillippine Islands.

8. *Ny. Theobaldi* (Giles).

For description, *vide* H. B., p. 299, or M., II., p. 311.

No note was made of the presence of a patch of golden scales on the dorsum of the apical abdominal segments, as the point was not, at the time of writing the description, considered of the special importance it now has, from having become a point of generic distinction, so that their presence on the small segments at the end of the abdomen is omitted to be noted in several of the descriptions of species of this genus, both in my Handbook and in the Museum Monograph.

9. *Ny. nivipes*, Theob., MS. name.

Wing with the costa white, interrupted by four black spots, the outermost of which is opposite the base of the anterior fork-cell, leaving a very long white tip; the second, placed just inside the cross-veins, is continuous on the auxiliary, but is longer and subdivided into three on I.; the remaining two spots are smaller, the basal being only a dot, confined to the costa; rest of wing sparsely dotted with black, and the pale-grey fringe spotted pure white at all longitudinal junctions. Last three hind tarsal joints and a broad band on apex of second snow white; most of the other joints apically white banded. Thorax black-grounded with oval white scales. Ground colour of abdominal segments black, rather pale basally, with numerous white scales on the last three segments.

♂.—Head black, with white fork-scales and frontal tuft; palpi black, with the clubs mainly pale. Pleuræ marbled white; femora and tibiæ rather pale, with mixed dark and whitish scales. *Length*, under 3 mm.

Habitat.—Kuala, Lumpor, Malay States.

10. *Ny. Stephensi* (Liston). *Ind. Med. Gaz.*, xxxvi., December, 1901. = *An. metaboles*, Theob. *Proc. Roy. Soc.*, lxix., p. 374. = *An. Farauti* Laveran (?) *Compt. Rend. Soc. Biol.*, Paris, 1902.

For description *vide* H. B., p. 512, or M. III., p. 93.

Laveran's species, from the Isle Vaté, in the New Hebrides, is very probably a synonym of this, but his description is too brief to admit of definitely placing the form without seeing the type.

The larvæ have simple frontal hairs, like *Theobaldi* and *maculatus*.

11. *Ny.* (*?*) *deceptor* (Dönitz). M., III., p. 105.

Wing dark at tip, pale at the base, there being four black portions on the costa, including the apical patch and a black basal dot, the intervening pale parts being much smaller; the rest of the long veins are about equally divided into dark and pale lengths, there being five black spots on VI.; the fringe is spotted, but the boundaries of the spots are rather ill-defined. As the legs are said to be marked like those of *leucophorus*, the tarsi are presumably pale-banded on the articulations, but nothing is said as to the characters of the thorax and abdomen. The wing, however, looks like that of a *Nyssorhynchus*, so that probably the scaly armature of those regions corresponds with the characters of that genus.

The terminal half of the palpi is white, with a narrow black ring at the commencement of the third and fourth joints, and the distal half of the proboscis also is whitish.

The only species with which it is likely to be confused is *M. albirostris*, Theob., but the wing is quite different. *Length.*—Of trunk, 3·4 mm., of head and proboscis, 2 mm.

Habitat.—Sumatra.

12. *Ny. fuliginosus* (Giles). = *An. Jamesii*, Liston (*nec* Theobald), = *An. leucopus*, Dönitz.

For description, *vide* H. B., p. 298, or M., I., p. 132, and III., p. 93.

In a specimen before me, the scales on the dorsum of the abdomen are almost confined to the two last segments, and are placed mostly on their hinder borders; those on the last being dark, while those on the preceeding segment are whitish. On the third last segment, there are only a few white scales on the hinder corners.

13. *Ny. annulipes* (Walker).

For description, *vide* H. B., p. 313, and M., I., p. 164, and III., p. 104.

The larvæ breed both in fresh and salt water. It has two curved, simple, median, frontal hairs, then two long simple, and at the outer angles, a pair of plumosely compound ones.

14. *Ny. Mastersi* (Skuse).

For description, *vide* H. B., p. 314, or M., I., p. 165.

GENUS CELLIA, Theob. M., III., p. 107.

Thorax with flat spindle-shaped scales. Abdomen more or less covered with long, narrow, curved or spindle-shaped scales irregularly disposed, and with dense lateral tufts. Palpi of the ♀ densely scaly. Wing-scales large, bluntly lanceolate, wings densely scaled. Easily recognised by their dense coat of irregular scales; totally unlike the typical *Anopheles*.

1. *Cel. Pharoensis* (Theob.).

For description, *vide* H. B., p. 302, or M., I., p. 169.

This species has come to hand from Gambia, and from the Blue Nile, in addition to Egypt.

2. *Cel. pulcherrima* (Theob.).

For description, *vide* H. B., p. 510, or M., III., p. 107.

3. *Cel. albofimbriata* (Giles).

For description, *vide* H. B., p. 302.

I believe that Mr. Theobald regards this form, which I described as a variety of *Cellia Pharoensis*, as distinct.

4. *Cel. Bigotii* (Theob.).

For description, *vide* H. B., p. 294, or M., I., p. 185.

5. *Cel. squamosa* (Theob).

For description, *vide* H. B., p. 314, or M., I., p. 167.

This species has recently been received from Pretoria in the Transvaal, and from Uganda, Central Africa.

6. *Cel. Kochii* (Dönitz). = *An ocellatus*, Theob.

For description, *vide* H. B., p. 315, or M., I., p. 174.

This species appears in my Handbook under Theobald's independently described designation, as I was unaware of Dr. Dönitz's previous description at the time those sheets passed the press.

It has recently been received from Perak.

7. *Cel. argyrotarsis* (R. Desv.).

For description, *vide* H. B., p. 295, or M., I., p. 123, and III., p. 110.

Appears to be common in all the West Indian Islands as well as in Demarara, Para, Trinadad, &c., but is less common than *Cel. albipes*. According to Dr. Low, it can act as a host for *Filaria nocturna*, but is inefficient for *F. Demarquaii*.

8. *Cel. albipes* (Theob).

For description, *vide* H. B., p. 300, or M., I., p. 125, and III., p. 110.

Mr. Theobald now agrees with me in considering this form as distinct from *argyrotarsis.* It is certainly much the commonest Central American and West Indian Anopheline, and is said to breed in canals, puddles, and in the most varied situations, even in brackish water. The larva has four nearly equal, simple frontal hairs.

GENUS ALDRICHIA, Theob. M., III., p. 353.

This genus is founded on a single ♀ specimen which was placed among the types of my *An. Rossii.* The specimens from which the species were described were given me by Major Ross, I.M.S., F.R.S., and though here was ample material for the purpose of description, some parts being perfect in one, others in another, there were, as a matter of fact, none that seemed suitable to deposit as types; and accordingly they were replaced by some selected specimens, beautifully mounted by Mr. Austen, and which we both thought to be uniform with the actual types.

Scale structure at that time had not, of course, been mooted as a principal systematic criterion in the gnat family, and nothing more powerful than a hand lens was ever used in work of this sort. Our ideas, too, of specific limits were much more elastic than they now are, when ingenuity is tasked to find adequate grounds for distinction beween so-called species, which differ only in some minute detail of banding of the palpus or in the presence of a few odd scales differently placed, so that it is in no way surprising that the fact of the presence of scales on the abdomen was overlooked, and the small differences in the spotting of the wing we should then have regarded as well within the limits of variability.

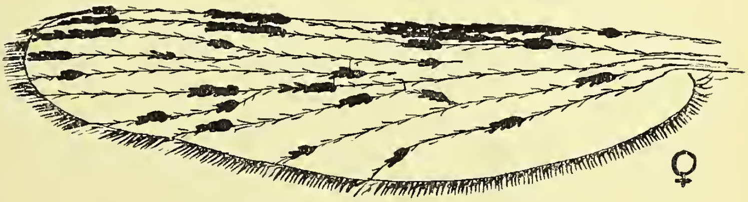
It may be admitted that, apart from the scaly abdomen, there are quite sufficient differences on which to erect a species, as species in this family now are made, but it appears strange that in all the large series of specimens available of *An. Rossii*, or of Rossii-like insects, only a single specimen of this genus should exist, and, for the present, though quite open to conviction on the production of adequate material, I strongly suspect the specimen to be but a deformity. The following is Mr. Theobald's definition of the genus :—

"Head with large and broad upright forked scales; antennæ with scales on the basal joints. Thorax with very narrow curved scales, almost hair-like; on the prothoracic lobes are outstanding flat scales. Abdomen completely covered with broad flat scales as in *Culex.* Wings spotted much as in *Myzomyia.*"

1. *Aldrichia error*, Theob. M., III., p. 363.

The single specimen on which this new genus and species is founded closely resembles *My. Rossii*, except that, when placed beneath the microscope, it will be seen that the entire dorsum of the abdomen is covered with purple-black, flat, imbricated scales, exactly as in a *Culex.*

The only other very noticeable point of difference that I can detect is that, as will be seen from the two figures below, the two large black spots near the base of *Rossii* are combined in the *Aldrichia* into a single long spot, and though I have met with specimens in which the pale interval is extremely small, I cannot say I have found them absolutely blended as in this case. But, allowing for this, the spots are essentially the same, the black dot near the root of II., which forms the foot of the T-shaped mark, being equally apparent in both. The difference in the apparent width of the wings may be neglected, as that of *Rossii* was drawn from a wing flattened out beneath a cover glass, whereas the other is, of course, taken from the type on its pin. Both, however, are camera-lucida drawings, and it must be admitted that the coincidence between the dark spots on the long veins is indeed remarkable if they be not the same species. The cross-veins are figured differently, but I would not vouch for the accuracy of this particular detail in the *Aldrichia*, as it is very difficult to make sure of their position in a specimen examined entire. In both specimens the first three or four joints of the antennæ are sprinkled with white scales, and where the prothoracic lobes are well preserved it is not uncommon to find what might be described as outstanding white scales.



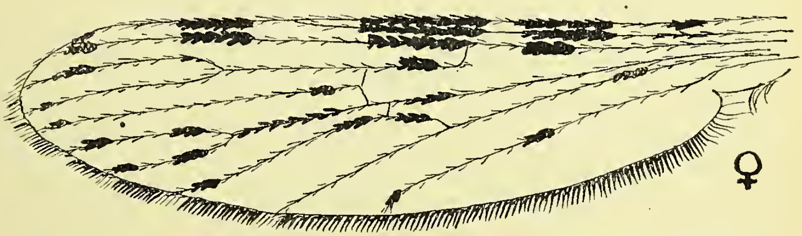


Fig. 1.—Wing of *Aldrichia error* ♀.

Fig. 2.—Wing of *Myzomyia Rossii* ♀.

Lastly, the peculiar bloom which may be observed on the abdomen of *Rossii* will, on close examination, be found to consist of ill-developed scales, and it only requires the abnormal development of these to convert an ordinary specimen into a monstrosity, such as I suspect this specimen to be, and in either case it may be remarked that its specific name will remain equally appropriate.

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